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ABSTRACT

This study compared college students who used the World Wide Web versus paper and pencil to respond to one of three surveys: the 1997 and 1999 Student Experiences Survey and 1998 University of Minnesota Graduate Survey. Students chose to respond by mail or via the Web. Researchers examined the proportion of students who used the Web versus those using paper and pencil; whether students using the Web differed significantly from those responding on paper; whether attitudes, experiences, and satisfaction levels of Web respondents differed significantly from those responding on paper; and whether rates of Web choice increased over time as respondents became more familiar with the Internet. Most students preferred paper and pencil, although the proportion of students selecting the Web doubled over time, suggesting that as students become more experienced in using the Web, their use increases. Younger students, who were more familiar with the Internet, selected the Web-based survey more often than older students. Men were more likely than women to use the Web-based survey. Current students in 1999 who selected the Web were significantly more likely to give the university high ratings in academic quality than were students who responded on paper. (SM)

A World Wide Web Response to Student Satisfaction Surveys:

Comparisons Using Paper and Internet Formats

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A World Wide Web Response to Student Satisfaction Surveys: Comparisons Using Paper and Internet Formats

Abstract

More institutional researchers view the World Wide Web as a vehicle to gather and display information, but initiatives to expand survey research to the Web have had mixed results. This investigation compares students who used a Web interface with those who used a traditional paper-and-pencil format to respond to one of three surveys. The authors compare students' responses, response rates and demographic characteristics by their method of response. Students responded more frequently to multi-paged surveys using paper-and-pencil formats. Men were more likely than women to respond to the Web format; increases in Web responses were highest for freshmen and sophomores. Percentages of students who responded using the Web doubled over a two-year period. Data suggest that as students gain comfort with the Web, responses to Web-based surveys will increase.

A World Wide Web Response to Student Satisfaction Surveys: Comparisons Using Paper and Internet Formats

A review of topics presented at the Association of Institutional Research (AIR) forums suggests that discussions on institutional methods and the delivery of survey research have increased in frequency, and continue to remain topics of discussion. This increase is especially true for surveys that include questions about the personal opinions and attitudes of current students and recent graduates, faculty, employees and their external constituencies. Yet, creating a well-designed survey with a high rate of response is often a challenge, even for the most seasoned researcher. One of the difficulties of institutional research arises in how to cover the costs of creating well-designed surveys, which are often expensive and time-intensive.

In the last three years, use of the Internet has expanded dramatically. Recent sales in on-line retail and participation rates in on-line banking point to a society that is more accepting of technology in the modern world. Thus, as the popularity of the Internet increases among college students, uses of World Wide Web surveys become more salient as a way to reduce postage costs and to shorten the time lag between mailing a survey and having the information in hand for decision-making purposes.

Initiatives to expand paper surveys to computer-administered formats have been welcomed with mixed results. Studies demonstrate that electronic surveying can reduce mailing costs and shorten the turn-around times for sending and receiving information

(Kiesler & Sproull, 1986; Parker, 1992.) In one study, cadets at the Air Force Academy responded more readily to a computerized survey than to a paper-and-pencil form, with no significant differences in their patterns of responding when paper and Web responses were compared (Antons, Dilla & Fultz, 1997.) Yet, in a study of a listserv discussion group, repeated electronic solicitations to complete an e-mail survey resulted in a response rate of only 24 percent (Meehan, & Burns, 1997.)

Research suggests that students' response rates to Web-based and other electronic survey formats can vary depending on their level of comfort with instructions, familiarity with the Internet, ease in completing the survey, need for confidentiality and/or personal characteristics such as gender, age, educational level and family income (Schlough & Bhuripanyo, 1998; Coates & Fansher, 1997; Saunders, Loren & Maylone, 1998.) As with paper-and-pencil surveys, differences in response outcomes point to the importance of research methods in influencing response rates (Gaddis, 1998.) Yet, as the use of the Internet becomes more common in colleges and universities, students may be more likely to respond to Web-based surveys with each new entering academic class.

Purpose

This study compares the responses, response rates and demographic characteristics of college students who replied to questions on a 1997 and 1999 Student Experiences Survey and to a 1998 U of M Graduate Survey. In all three studies, students were offered a choice between responding by mail or via the Web.

Specific questions the study addressed included:

1) What proportion of current students and graduates will choose to respond to a Web survey rather then a paper-and-pencil format? Does the response rate to these surveys vary depending on the type of survey used?

2) Do the students who respond to Web surveys differ significantly from those who choose to respond using paper-and-pencil formats on such characteristics as gender, ethnicity or age?

3) Do the attitudes, experiences or satisfaction levels of students who respond via the Web differ significantly from those who respond by paper-and-pencil?

4) As students become more familiar with the Internet, do their response rates to Web surveys increase over time?

Method

Sample

The study examined the responses from the students who replied to a Student Experiences Survey in 1997 and 1999, along with a comparable group of recent graduates who replied to a U of M Graduate Survey in 1998. Data were gathered for the 1997 and 1999 surveys using a random sample of currently enrolled undergraduates from the Twin Cities' Campus. Sample 1 consisted of 866 undergraduate students (55.7% of a random sample of 1591 students) who replied to the 1997 Student Experiences Survey using either a Web interface or paper and pencil format. Sample 2 consisted of a comparable group of 2, 626 undergraduate students who replied to a 1999 Student Experiences Survey, a slightly modified

version of the 1997 Student Experiences Survey. Significantly more students were selected for the second sample to allow for greater comparisons across data categories.

Sample 3 included 769 students (56.5% of a random sample of 1360 students) who responded to a survey in 1998. The sample used data from Spring 1996 degree recipients from the University of Minnesota, Twin Cities.

Procedure

The 1997 and 1999 Student Experiences Surveys were eight-page surveys developed by a committee of institutional researchers to assess students' experiences and levels of satisfaction on a variety of indicators including the quality of teaching, quality of advising, experiences with computers, and general satisfaction with the student experience. Surveys were sent to a random sample of currently enrolled undergraduates in the spring of each year to assess their levels of student satisfaction within a large research institution. In 1998, an eight-page, U of M Graduate Survey was mailed to persons who graduated from the same university in 1996 to survey their views of the university and their post-graduation experiences. All surveys were available for students to respond by mail or by the Web. To enter the web survey, students had to enter a code number that was enclosed in the mailing of the questionnaire.

The Web-based surveys were programmed using Cold Fusion software, and data were stored in an Access database. Students were contacted by mail and were sent a mail survey with the option of responding via the Web by accessing the Web address and by typing in their name, password and survey ID. Students who failed to respond to each of the surveys received a series of reminders. Postcards, follow-up reminders and multiple mailings

of the surveys were sent to those who failed to respond within a two-week interval. Prize incentives were also used to increase the response rates. After a series of multiple mailings, response rates ranged from 56 percent to 60 percent for each of the surveys. Descriptive statistics and a series of chi-squared tests were used to compare the characteristics, experiences and attitudes of students to each survey by the format used, given the unequal sample sizes and nonnormal distributions. For the process of the chi-squared test, items which used a 5 or 6 point rating scale were recoded , so that responses from fair to very poor were coded as 'low' and responses from good to excellent were coded as 'high'.

Results

Responses to the Web and Paper Surveys by Survey Type and Format

Response rates for each of the surveys are provided in Table 1 and are based on the proportion of students who responded to the surveys using the Web or paper-and-pencil formats. When given the option, students were significantly more likely to respond to the multi-paged surveys using the paper-and-pencil format. Web-based responses to the Student Experiences survey doubled over time, increasing from 7.4% in 1997 to 14.9% in 1999. Differences were statistically significant ($p<.01$.)

Respondents to the 1998 U of M Graduate Survey were about 2 percent more likely to respond using the Web-based format than were students who responded to the 1997 Student Experiences Survey. However, the graduates were almost 6 percent less likely to respond to the Web-based format than those who responded to the 1999 survey.

Table 1: Response Rates of Students, by Survey Type and Response Format

Survey Type Year	Total Respondents	Response Format: Web %	Response Format: Paper-and- Pencil %
Student Experience Survey			
1997	866	7.4%	92.6%
1999	2627	14. 9%	85. 1 %
Graduate Survey			
1998	796	9.2%	90.8%

Response Rates to Web Surveys by Gender, Ethnicity, Class and Collegiate Unit

Table 2 presents the response rates for the three Web-based surveys by gender, ethnicity, class and collegiate unit. Responses to the Web-based formats were analyzed on the basis of gender, ethnicity (coded as white and non-white/other), class and collegiate unit. Men were significantly more likely than women to respond to the Web-based format in each year, when chi-square statistical tests of significance were used. Over time, the proportions of students who responded by the Web doubled in frequency for each gender.

No significant differences in response formats emerged between the White and Non-White/Other comparisons in ethnicity for those who responded to the Student Experiences Survey. Yet, some caution should be used in interpreting the data for 1999, since many students chose not to respond to this item. However, international students, included in the "Other" category did respond in higher proportions to the Web than did the White majority. Some statistically significant differences did appear for respondents of the Graduate Survey ($p < .04$), with White students responding more readily to a Web-based survey than nonwhite students.

Web response rates differed by class level for two of the three survey years. No explanatory trends in students' responses to the Web-based survey emerged by undergraduate class level for respondents in 1997. Yet, by 1999, lower division students were significantly more likely to respond to a Web-based survey than were upper division students. In addition, undergraduates who attained their degrees in 1996 were statistically more likely to respond to a Web-based version of the Graduate Survey in 1998 than were students who attained a graduate degree during the same year. Thus, younger students were more likely to respond to a Web survey than were older students.

Statistically significant differences in collegiate unit were apparent in all of the surveys. Students enrolled in the area of Technology were significantly more likely respond to the survey using the Web format than were students from other disciplines. However, the proportions of students who responded using the Web option increased over time for all students in all disciplines, except for those enrolled in education.

Table 2. Percentages Who Responded to a Web Survey by Demographic Characteristics and Survey Type

	Student Experiences Survey 1997		Student Experiences Survey 1999		Graduate Survey 1998	
Variable	n	% Web response	n	% Web response	n	% Web response
Gender						
Male	378	11.6	1165	22.7	332	14.2
Female	482	4.8	1482	8.8	437	5.5
Ethnic Status						
Non-White	153	9.2	169	14.4*	105	6.0
White	700	7.6	257	17.2	661	9.7
Undergraduate Level						
Freshman	160	11.3	204	17.2	not applicable	
Sophomore	170	5.9	551	20.3	not applicable	
Junior	184	4.9	450	14.9	not applicable	
Senior	199	10.6	1041	12.6	not applicable	
Class Level						
Undergraduate	not available		not available		653	10.0
Graduate/Prof	not available		not available		103	2.9
College						
Business	29	6.9	67	11.9	61	11.5
Education	22	4.5	27	3.7	26	0.0
Technology	163	15.3	584	24.5	136	16.2
Bio Sci	48	6.3	293	13.3	29	20.7
Lib Arts	357	7.9	742	14.3	357	7.6

* 83% did not respond to the Web survey.

A separate analysis, which is not shown in the table, compared the income level of students who responded to the Web survey with persons who responded to a paper-and-pencil option, based on their response to a question which asked them to provide information on their personal, pre-taxable income for 1997. Nine possible salary categories were provided ranging from 'under $10,000' to '$80,000 or more." In this comparison, Web response formats for persons with incomes above $60,000 were compared to those with incomes below this amount. No significant differences emerged between response format and income level for the graduates.

Response Rates to Web Surveys by Computer Experiences

All of the surveys contained questions relating to students' access to and use of computer technology. (Data are presented in Table 3.) A total of eight items were asked across the three surveys, but the questions were not uniform from survey to survey. The data in Table 3 are only presented for the surveys in which they appear.

In all surveys, current students and graduates who had accessed information on the Web were significantly more likely to respond to a survey using the Web. In 1997 and 1999, having 24 hour access to computers was related significantly to increasing ones' likelihood of responding to a Web-based survey format. By 1999, this likelihood of responding to a Web survey correlated significantly with such experiences as having received or turned in an assignment electronically in class.

In contrast, experiences with a word processing package or prior experiences in accessing on-line library services were not related to ones' likelihood of responding to a Web-based survey. Findings for those who had taken courses delivered through the Web were

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Table 3. Percentages of Students Who Responded to a Web-Based Survey As Related To Their Experiences With Computers and Technology

Survey Item	Student Experiences Survey 1997				1999				Graduate Survey 1998			
	n	Percent Yes	n	Percent No	n	Percent Yes	n	Percent No	n	Percent Yes	n	Percent No
24 Hr Access Computers	561	11.1	301	1.7*	1629	17.4	923	10.4*	N/A	N/A	N/A	N/A
Web Course	514	8.9	348	6.0*	2255	15.0	314	12.2	10	1.4	749	9.2*
Sent/Received Email	809	8.3	0	0.0*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Turned In/ Received Assign. Electronically.	N/A	N/A	N/A	N/A	1532	17.3	1033	11.4*	N/A	N/A	N/A	N/A
Accessed Web Information	774	8.5	89	1.1*	1383	16.8	1191	12.9*	394	13.7	369	4.1*
Accessed Lumina	740	7.7	123	8.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Accessed Public Lab	732	8.2	130	5.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Used Word Process Pkg.	788	7.9	75	6.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*p< .05

on the Internet , thereby encouraging them to respond to questionnaires, exams or other on-line tasks.

Ratings of Satisfaction by Those Responding to Web Versus Paper and Pencil Formats

This section provides information on students' ratings of satisfaction, attitudes towards University services and experiences with the University, based on their responses to approximately seventy different items contained within three eight-page surveys. Only one significant difference emerged on global items relating to academic quality, overall satisfaction and to satisfaction with the quality of teaching or advising. Current students in 1999 who responded to the Web format were significantly more likely to give the University high ratings in academic quality. In addition, University graduates who responded using the Web rated the University significantly higher on items relating to their employment following graduation and to the preparation they felt they had gained to perform in their careers. Percentages of ratings for Web responses appear in Table 4.

Students who responded to the Graduate Survey rated the University on over twenty different skill areas. Those who responded through the Web rated the University significantly higher in relation to the computer skills they had gained and in their ability to locate information. Graduates gave slightly higher ratings to items associated with networking, adaptation to change, creativity, mastery of job skills and persistence, though most findings were not statistically different. A sample of the ratings for items analyzed appear in Table 5.

Table 4. Overall Satisfaction of People Who Responded to A Survey Via the Web

	Student Experiences Survey								Graduate Survey			
	1997				1999				1998			
	High		Low		High		Low		High		Low	
Survey Item	n	%	n	%	n	%	n	%	n	%	n	%
Academic Quality	681	7.3	174	9.8	2240	15.8	334	10.8*	N/A	N/A	N/A	N/A
Overall Satisfaction	712	8.3	144	4.9	2248	14.7	356	16.3	688	9.4	7.9	7.6
Instruction	662	8.3	204	5.9	1989	15.4	612	13.4	669	9.0	99	11.1
Advising	302	8.9	481	6.7	1065	14.9	1338	14.8	381	10.0	385	8.6
Sat.Employ	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	484	10.0	98	3.1*
Prep.Career	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	362	11.6	395	7.3*

*p<.05

The responses for students who answered a survey through the Web appear in Table 6 for nine of the comparisons. Students in 1997 who responded by the Web format rated the University significantly lower in a variety of areas including cost, response to concerns and places available to study. In contrast, in the same year, University services were rated significantly higher in areas of finance, registration and athletic services. Some of the rating differences between Web and paper-and-pencil groups which prevailed in 1997, diminished in 1999, particularly in areas pertaining to registration services, finances and places to study. This suggests that over time, services either changed at the University or those

Table 5. Ratings by Alumni Who Used the Web on Skills Learned at the University

	Graduate Survey			
	1998			
	High		Low	
Survey Item	n	%	n	%
Critical Thinking Skills	481	8.9	281	9.0
Analytic Skills	485	9.7	275	8.7
Creativity	313	11.5	448	7.8
Ability to Learn	452	9.7	309	8.7
Cooperate With Others	428	9.6	333	9.0
Lead Groups	324	10.5	437	8.5
Interaction w/ Diverse Groups	405	9.4	356	9.3
Network w/ Others	211	12.3	549	8.0
Job Skills	300	10.7	458	8.3
Knowledge	365	10.4	397	8.1
Computer Skills	301	14.6	458	5.9*
Solve Problems	459	9.8	301	8.6
Locate Info Materials	294	12.2	469	7.5*
Adaptation to Change	383	11.0	373	7.8
Persistence	451	10.9	312	7.1

*P< .05

who responded via the Web became more like those who responded using paper-and-pencil formats.

Table 6. Satisfaction Ratings In Other Areas of the Academic Experience by Students Who Responded To The Web Survey

	Student Experiences Survey							
	1997				1999			
	High		Low		High		Low	
Survey Item	n	%	n	%	n	%	n	%
Cost	357	5.0	487	9.9*	1338	17.7	1237	12.3*
Research	608	7.9	204	7.8	1919	15.9	585	12.3*
Response to Concern	335	4.5	513	10.1*	1380	15.7	1168	14.2
Cultural Diversity	601	5.8	250	12.8	1981	15.5	583	13.4
Places to Study	590	6.3	266	11.3*	1917	14.9	665	15.5
Motivation to Learn	633	7.7	233	7.7	1907	14.9	694	14.8
Registration Services	402	12.2	446	3.6*	1078	16.2	1429	14.1
Finance Services	142	12.0	431	6.0*	538	15.6	1310	14.8
Athletic Services	393	9.4	234	3.8 *	1177	15.5	696	14.8

*P< .05

Discussion

This study was exploratory in nature and thus many of the trends and findings are intriguing, but inconclusive. In all cases, most students preferred to respond to the surveys through the paper-and-pencil format.

Discussions with the persons who developed the Web format and findings from the literature suggest that responses to the Web-based format may have been higher had students received an email message containing a link to the Web page, if the Web format had included data encryption so that the students were assured of a higher level of confidentially in their responses, or if there were provisions for students to begin the on-line survey, leave it and return to it at a later time.

Findings suggest that as students become more comfortable in using the Internet, their compliance in completing a Web-based survey will increase. Such trends were evidenced when the proportion of students who selected the Web survey doubled over a two-year period. They were further illustrated when younger students, who were more familiar with the Internet, selected a Web-based survey in higher proportions than upper classman or graduate students.

Despite such findings, gender differences and some experiential variations prevail. This suggests that although Web surveys may serve as a window to the future, limiting oneself to one platform-particularly Web-in the current environment could bias the results obtained on certain items for particular student sub-populations, depending on the questions asked, ease in

accessing the form, length of the survey and/or way in which the survey appears on a particular student's Web browser. Web-based surveys must therefore be well designed and easy for students to use, or students simply will not respond to them. More research is needed to facilitate the use of such modalities over the next three to five years. Following that, Web surveys may serve as the predominant format for surveys of students, faculty and staff.

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